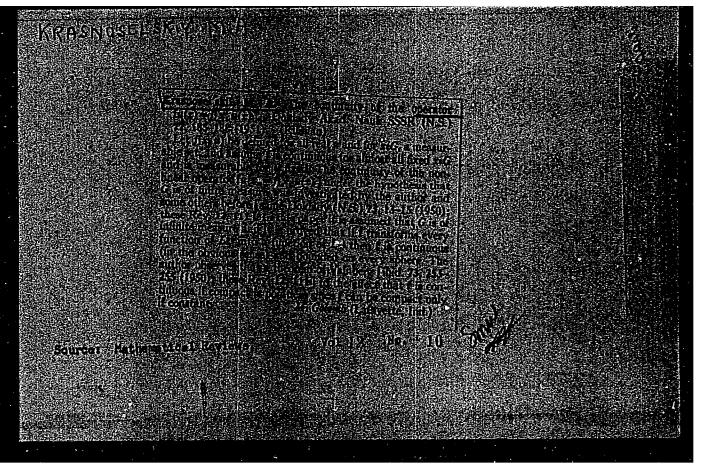


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KRASNOSEL'SKIY, M. A.

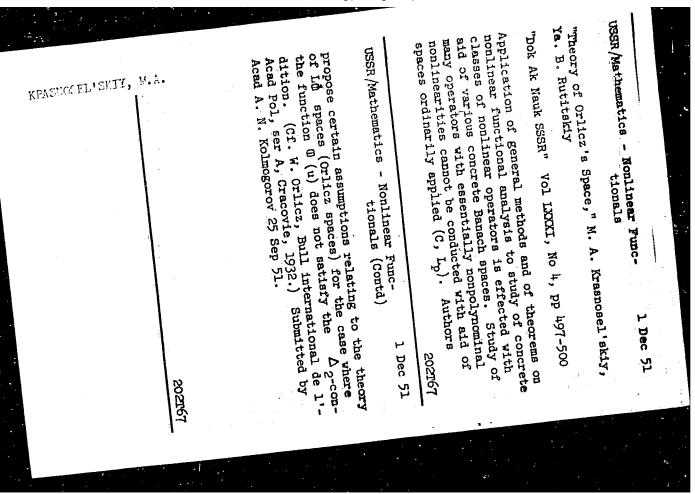
USSR/Mathematics - Operators, Vector

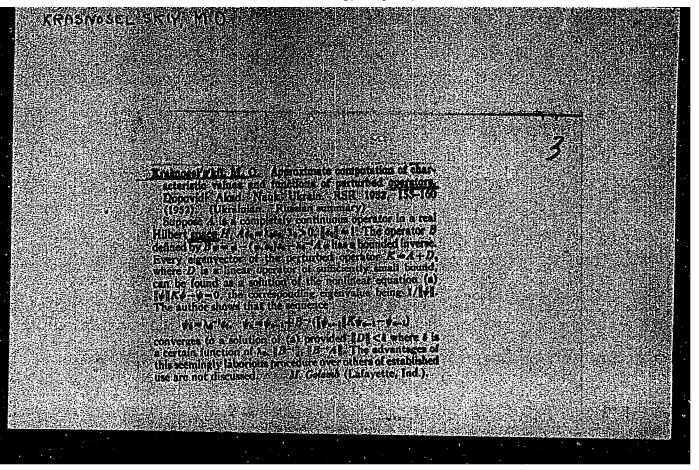
21 Jul 51

"Problem Concerning the Points of Bifurcation,"
M. A. Krasnosel'skiy, Inst of Math, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXIX, No 3, pp 389-392

The number L (in eq F = LAF, where A is a continuous operator operating in a real Banach space E and satisfying the condition $A\theta = \theta$ (θ is a zero of E); F is an eigenvector of A) is called a point of bifurcation of operator A if for any pos nonzero e there exist in the interval (L-e,Lee) eigenvalues of the operator A to which correspond eigenfunctions with norm as small as desired. Submitted by Acad A. N. Kolmogorov 16 May 51.





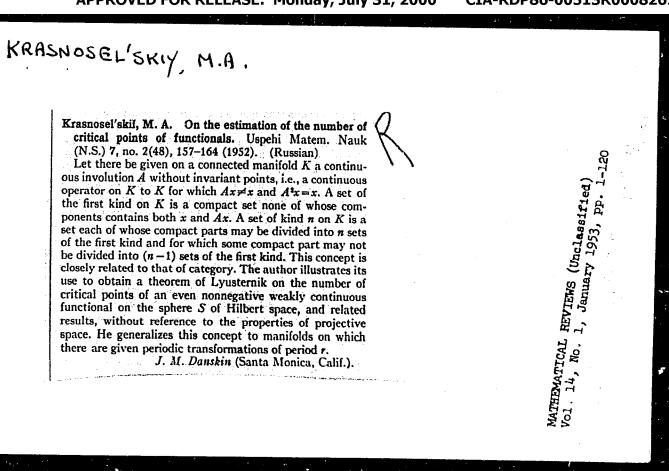
KRASNOSELISKIY, M. A.

USSR/Mathematics - Nonlinear Iteration

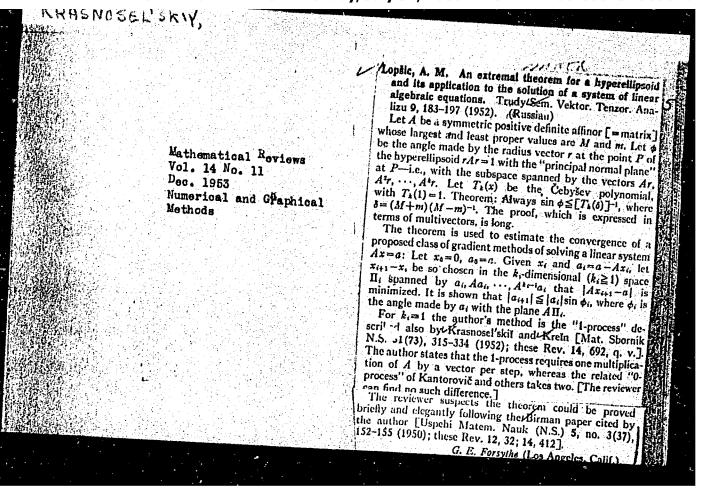
Jan-Mar 52

"Iterative Process with Minimum Residual," M. A. Krasnosel'skiy and S. G. Kreyn Ukrain Mat Zhur, Vol 4, No 1, pp 104-105

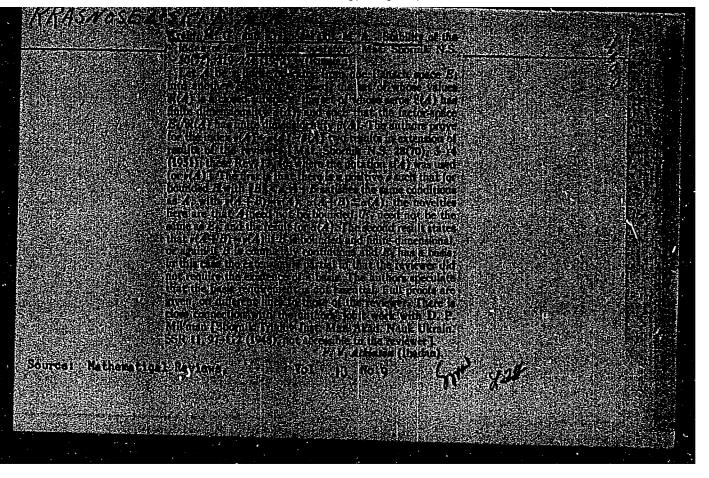
(Report given at 23 Oct 51 session of Sci Council of Inst of Math, Acad Sci Uk SSR.) Problem of approx soln of system of eqs Bx=b (B positive definite square n-matrix, b known n-vector, x desired n-vector) can be solved by finding approx soln as close $A_n = A_n = A_n$

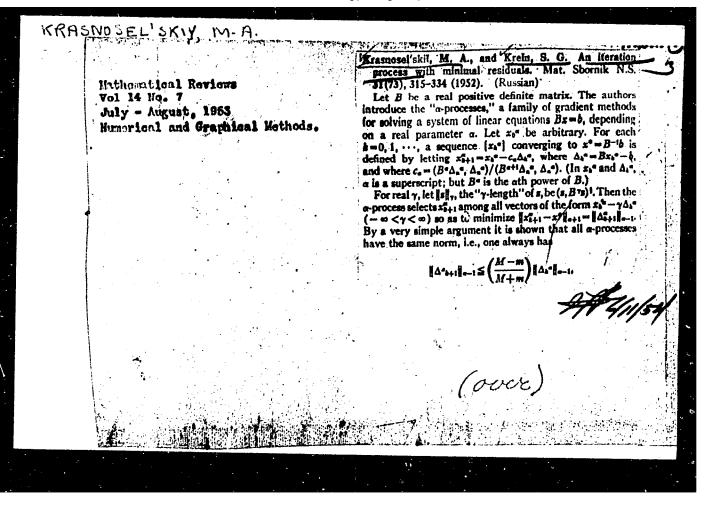


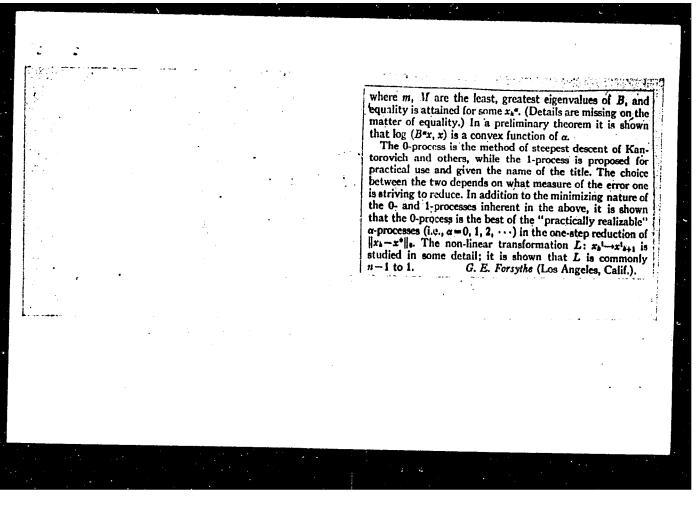
225764		most probable formula	s to refute the errors are al- ax errors. As:	Vol VII, No 4 (50), pp 157-	"Note on the Distribution of Errors During the Solution of a System of Linear Equations by an Iteration Process," M. A. Krasnosel'skiy, S. G. Kreyn	sse, Jul/Aug
	.*	errors are the most puthe recurrent formula. A is a matrix.	8 6 7	VOL VII, NO	Distribution of Errors During s System of Linear Equations by ocess," M. A. Krasnosel'skiy, S	Iteration Process, Approximation
		erre the A	purpose of the present note othesis that the most probabl s considerably less then the	Nauk"	lstributi System of ess," M.	
		turns out, the max (errors. Considers .	The purpose of bypothesis that ways considerab	"Uspekh Matemat 161	on the Di lon of a S bion Proc	USSR/Mathematics



"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120







USSR/Mathematics - Operators, Hermitian 21 Jan 52

"Beparation of Operators Operating From Space Lq Into Space Lp," M. A. Krasnosel'skiy, Inst of Math, Acad Sci Ukrainian SSR

"Dok Ak Nauk SSSR" Vol LXXXII, No 3, pp 333-336

Obtain such representation as A*HH* for certain operators defined in Lq, as a natural generalization of the operator representation A = A*1/2 . A*1/2. Subject problem arose in connection with one of the works of M. Golomb (Math Zs, 39, 1, 1934). Submitted by Acad A. N. Kolmogorov 23 Nov 51.

space L _{M2} (G). A. Zaanen has investigated toperator A (see Ann of Math, 47, No 4, 1946. mitted by Acad A. N. Kolmogorov 28 Apr 52.	Stud Stud = /G1 measi is a also opers	
(G). A. Zaanen has inver A (see Ann of Math, 47, N) Acad A. N. Kolmogorov 28	ope all set	
this 6. Sub-	"Dok Ak Nauk SSR" Vol LXXXV, No 1, pp 33-36 Studies the following linear integral operator: Au(x) - /GK(x,y)u(y)dy, where K(x,y) is a function measurable on G (topological product GxG, where G is a compact set in n-dimensional Euclidean space); also explains when it will be a continuous operator operating from one Orlicz space I _{M1} (G) to another	Operators, Li Integral perators in Or

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KRASNOSEL'SKIY, M. A.

USSh/Mathematics - Operator Index

Ju1/Aue 53

"Index of Unbounded Operator," I. Ts. Gokhberg, Soroki, koldavian SSR

hat Shor, Vol33 (75), No 1, pp 193-198

Considers: a linear operator A that acts from a certain Banach space \mathbb{F}_2 ; the region D(A) that defines A; the region R(A) of A's values. Assumes that the operators A possess the following properties: Ax=0 has a finite number of linearly independent solutions T(A) of measure a(A); the factor-space $\mathbb{F}_2/\mathbb{R}(A)$ has two theorems. Cites the related work of E. G. Kreyn and M. A. krasnosel'skiy Presented 1 Oct 52.

271T88

KRASMOSHERSKIN M. AS	
TRASNOSEL'SKIY, M. A.	
	Krasnosel'skii, M. A. Application of variational methods to the problem of branch points. Mat. Sbornik N.S. Suppose A is a nonlinear open.
	to the problem. A. Application of many
	33(75), 199-214 (1052) or branch points. Mat Simethods
	Suppose A is a nonlinear operator in a real Hilbert space φο εθ, then λο is an eigenvalue
	II, which leaves the zonal operator in a real trin
	φοσθ, then λο is an aigenment θ invariant If A space
그들은 얼마 그 그 얼마 그 얼마 나를 받다.	As is a few As a series of the
	an airms point of A if for any
Mathematical Reviews	\varphi <\delta . The main == digenvector \varphi for which there exists
Analysis	
	unctional Φ ($\Phi(\theta) = 0$) and nine gradient of a weakly continuous
10-7-54	
	of this theorem is based on a minimax construction functional Φ, along the lines developed by Lyustern 1.
L'A	functional Φ_i along the lines developed by Lyusternik and Snirelman [Uspehi Matem. Nauk (N.S.) 2, no. 1 (17), 166-nonlinear integral equation $\lambda \varphi(x) = \int_{0}^{\infty} K(x, y) f(y) dy$
	nonlinear integral equation $\lambda \varphi(x) = \int_{0}^{\infty} K(x, y) f[y, \varphi(y)] dy$, $M. Golomb (Lafayette Ind.)$
하는 것들은 가는 사람들은 그는 살이 된 살쏭	1.7 J (J) (J) (D) (D) (T) (T) (T) (T) (T) (T) (T) (T) (T) (T
	M. Golomb (Lafayette, Ind.).

KRASNOSELISKIY M. A.

USSR/Mathematics - Integral Operator 11 Feb 53

"Certain Properties of the Root of a Linear Integral Operator," M. A. Krasnosel'skiy, Inst of Math, Acad Sci Uk SSR

DAN SSSR, Vol 88, No 5, pp 749-751

Investigates the eq of the type f = (lambda) Gf, where operator G is the gradient of a certain functional specified in a Hilbert space and lambda is the eigenvalue. Investigates cases of more complicated operators. Presented by Acad A. N. Kolmogorov 15 Dec 52.

2581798

KRASNOSELISKIY, M.A. USSR/Mathematics - Nonlinear Integral 21 Feb 53 Equations "New Theorems on Existence of Solutions of Nonlinear Integral Equations," M. A. Krasnoselskiy, Voronezh DAN SSSR, Vol 88, No 6, pp 949-952 Analyzes conditions discussed by A. Hammerstein (Acta Math. 54, 1929) for solvability of Hammerstein's eqs. Considers functionals in a Hilbert space only. Presented by Acad A. N. Kolmogorov 258m02

KRASNOSEL'SKIY, M.A.

USSR/ Mathematics - Nonlinear Integrals

1 April 1953

"Differentiability of Nonlinear Integral Operators in Orlicz Spaces", M.A. Krasnosel'skiy and Ya. B. Rutitskiy

DAN SSSR, Vol 89, No 4, pp 601-604

Investigate the operator $Hf(x) = \int_G K(x,y) F[y,f(y)] dy$, where G is a compact set of n-dimensional spaces, and show that this operator with extensive classes of kernels K(x,y) and nonlinear functions F(x,u) can be studied by means of Orlicz spaces (see A. Zygmund, Trigonometric Series, 1939). State that the general principles of functional analysis permit one to investigate the eq $f = \lambda$ Hf (H is a nonlinear operator) but finer theorems (namely, on bifurcation points, stability of solutions, eigenfunctions, etc.) are successful in establishing when H is a differential operator. One author cites earlier work (Ya. B. Rutitskiy, Dopovidi Akad Nauk RSR, No 3, 1952).

2561799

KRASMOSEL SKIY, M. A.

1 Jul 53

USSR/Mathematics - Variational Method

"Variational Methods in the Problem of Bifurcation Points," M. A. Krasnosel'skiy and A. I. Povolotskiy

DAN SSSR, Vol 91, No 1, pp 19-22

Generalize results of investigations of nonlinear operators A that operate in Banach space E and transform zero Q of this space to zero O; namely, operators A of the form JG, where J is a certain unitary operation coinciding with unit I in one invariant subspace of linear operator B and equal to -I on the orthogonal complement, G (Go=0) is a gradient operator of a weakly continuous functional defined in Hilbert space H and possesses at point O a Frechet derivative of B (this derivative a linear self-adjoint positive-definite operator). Presented by Acad A. N. Kolmogorov 22 Apr 53.

266179

KRASNOSELISKIY, M. A.

USSR/Mathematics - Nonlinear Integrals

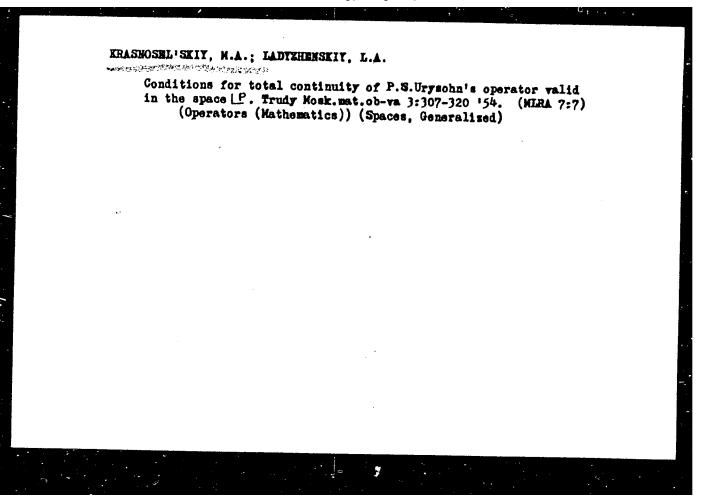
11 Sep 53

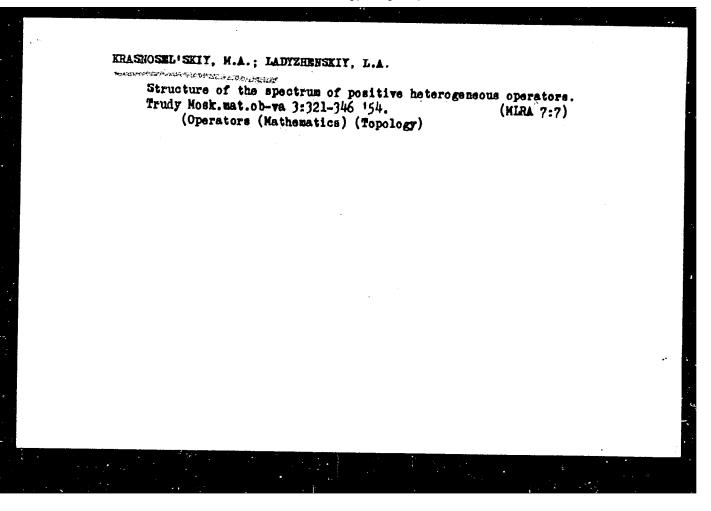
"The Structure of a Certain Operator," M. M. Vaynberg

DAN SSSR, Vol 92, No 2, pp 213-216

Considers the problem of whether a given operator h generated by a real function f(u,x) depends upon the structural properties of f(u,x), where f(u,x) is defined for all real u and for all x in the measurable set B of Euclidean space s of dimensions by the equality hu f(u(x),x). Notes that h was studied earlier by V. V. Nemytskiy (Matem Sbor. 41, 438 (1934)), by the author in 1949, and by M. A. Krasnosel'skiy (Ukrain Matem Zhurn. 2, No 3, 1951). Completes the investigation of the continuity of h for an extensive class of functional spaces, and shows that the necessary and sufficient criterion of continuity. Presented by Acad S. L. Sobolev 13 Jul 53.

269T74





"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000826120

FD-1162

KRASNGSEL'SKIY, M.A.
USSR/Mathematics - Nonlinear analysis

Card 1/1

Pub. 118-3/30

Author

Krasnosel'skiy, M. A.

Title

Some problems of nonlinear analysis

Periodical

: Usp. mat, nauk, 9, No 3(61), 57-125, Jul-Sep 1954

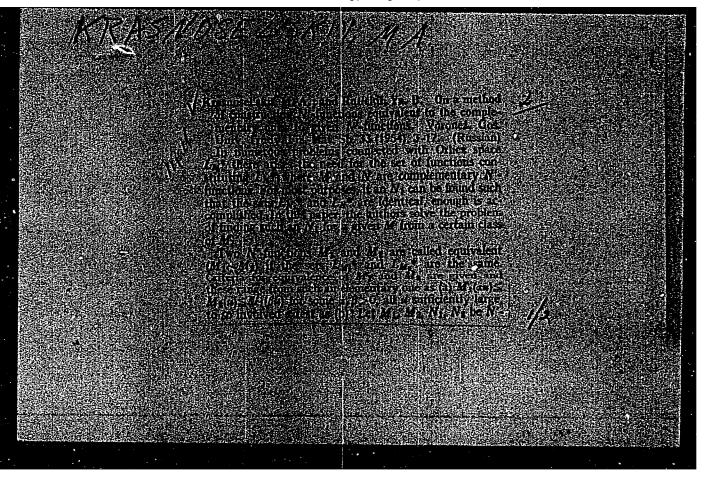
Abstract

: The author presents a survey article in which considers a number of problems in the theory of nonlinear equations, differential or integral, such as are found in mathematical physics and technology. He treats in particular the transition to operator equations (e.g. choice of space, operators of P. S. Uryson and Hammerstein, operator of Lyapunov, application of Orlicz spaces, differential operators, potential operators); the existence and uniqueness of solutions (e.g. choice of method of study, method of successive approximations, principle of the fixed point, the Lerey-Schauder method, index of solution, variational method of proving existence theorems, approximate solution by Galerkin method); eigen-functions of nonlinear operators (e.g. existence of eigen-vectors, problem of points of bifurcation, spectral study, eigenfunctions of positive operators). The author thanks V. I. Sobolev. Fifty-five references; e.g. P.S. Aleksandrov, M. M. Vaynberg, F. R. Gantmakher, M. G. Kreyn, L. A. Ladyzhenskiy, Ya. B. Rutitskiy, A. I. Povolotskiy, A. I. Nekrasov, etc.

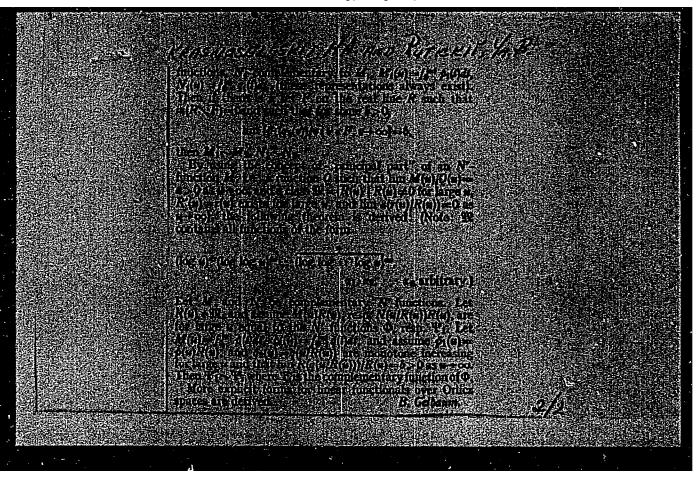
Institution :

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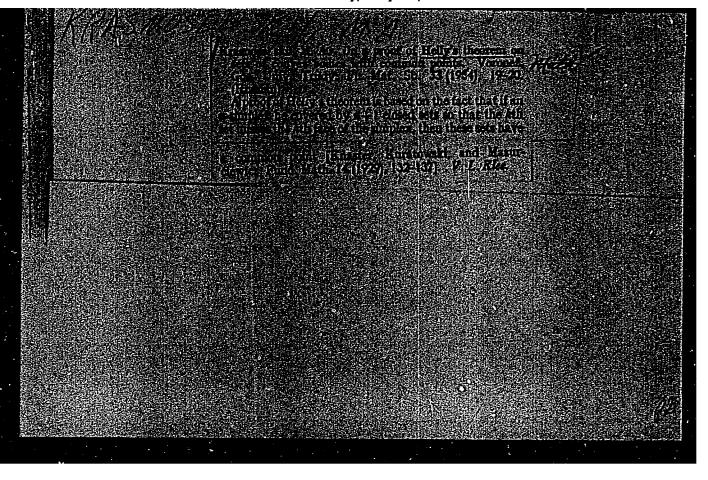
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KRASNOSEL'SKIY, M.A.; RUTITSKIY, Ya.B.

Linear functionals in Orlicz spees. Dokl. AN SSSR 97 no.4:581-584 Ag '54. (MLRA 7:9)

1. Predstavleno akademikom P.A.Aleksandrovym (Functional analysis) (Spaces, Generalized)

KRASNOSKLISKIY. N. A.

USSR/Mathematics

Card 1/1 Pub. 22 - 6/48

Authors Krasnosel'skiy, M. A.

Title Splitting the linear integral operators acting from one Orlicz space

into another.

Periodical Dok. AN SSSR 97/5, 777 - 780, August 11, 1954

Abstract A series of theorems are proved in order to legalize the reduction of

 $A\varphi(s) = \int K(s,t) \varphi(t)dt$, used in analysis the integral operator

of non-linear equations by the method of calculus of variations, to the form A = HH". Eight references (1931-1953).

Institution : Voronezh State University

Presented by: Academician A. N. Kolmogorov, May 27, 1954

USSR/Mathematics - Topology

Card 1/1 : Pub. 22 - 3/44

KRASNOSEL'SKIY. M. A.

Authors . Krasnosel'skiy, M. A.

Title 1 On stability of critical meanings of even functionals over a sphere

Periodical : Dok. AN SSSR 97/6, 957-959, Aug 21, 1954

Abstract : Lusternak's theorem on special properties of even functionals having an infinite number of critical meanings on every sphere in Hilbert's space is analyzed and criticized. Four references:

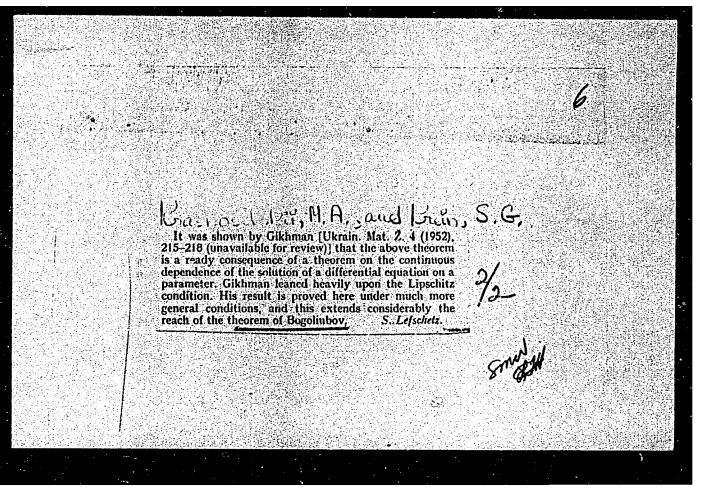
(1930-1953).

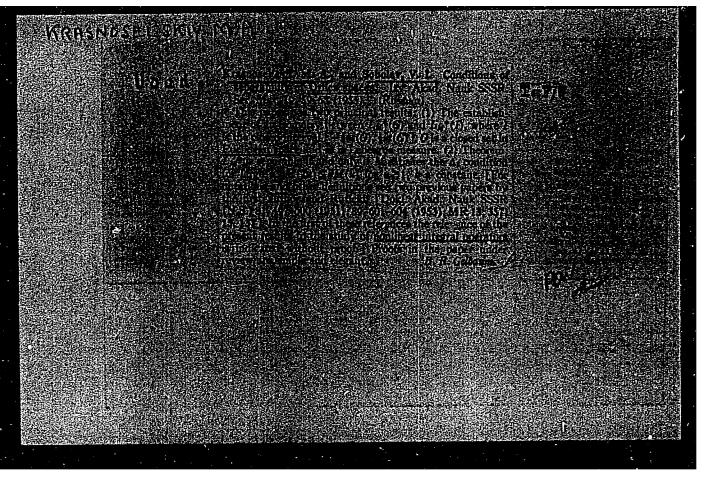
Institution : Voronezh State University

Presented by : Academician P. S. Alexandrov, May 27, 1954

Two remarks on the method of sequential approximations. Usp. nat.nauk. 10 no.1:123-127 '55 (MERA 8:6) (Approximate computation)(Topology)

Krasnosel'skil, M. A., and Krein, S. G. On the principle of 1: 7/1	
(N.S.) 10 (1955), no. 3(65), 147-152, (Russian)	
$(1), \qquad x = eX(x, f) \qquad \qquad //3$	
with x , X n-vectors and x varying in a bounded domain D of E^* , suppose that for every x in D	
(2) $\lim_{T\to +\infty} \frac{1}{T} \int_0^T X(x,t) dt = X_0(x)$	
T→+∞ 1 / € exists. Take now the system	
$y = \epsilon X_{\bullet}(y)$	
and let $x(t)$, $y(t)$ be solutions of (1) and (3) such that $x(0) = y(0) = x_0$. Bogoliubov proved [On some statistical methods in	
SSR, 1945; MR 8, 37] the following theorem Let 271, at	
be bounded in D and satisfy there a Lipschitz condition with constant independent of x, t. Let also the limit (2)	
exist for every x in D. Suppose finally that off is known	
for $e=1$ and $l \in [0-T]$ and together with a certain neighborhood does lie in D . Then, given $\eta > 0$, there	
exists $\epsilon_0 > 0$ such that for $0 < \epsilon < \epsilon_0$, $\tau(t)$ as defined above is in modulus within an η -neighborhood of $y(t)$ bn $t \in [0-T/\epsilon]$.	

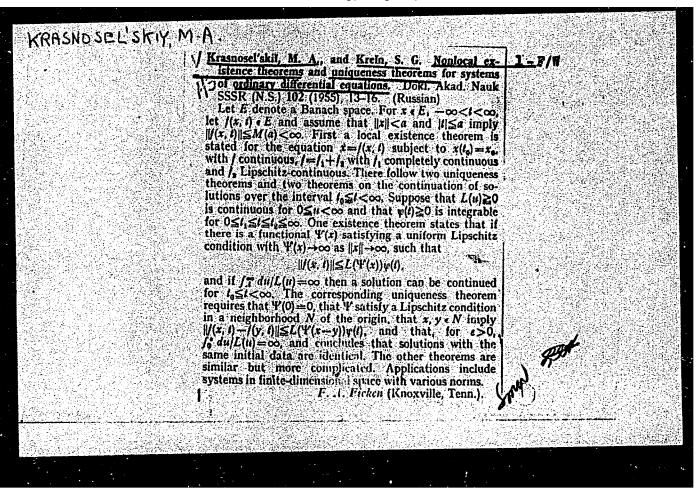


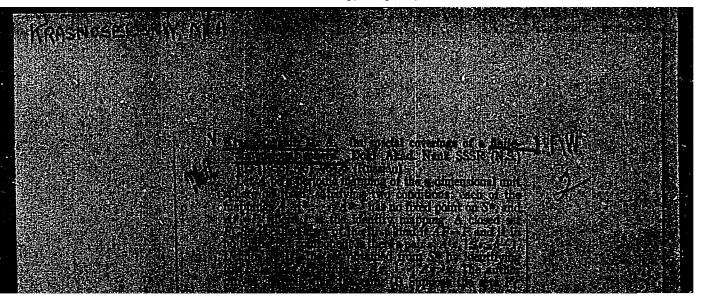


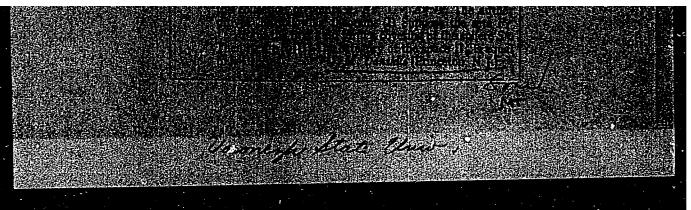
KRASNOSEL'SKIY, M.A., (Voronesh)

Stability of critical values of even functionals on a shere.
Mat.sbor.37 no.2:301-322 S-0 '55. (MIRA 9:1)
(Functional analysis) (Topology)

Krasnosel'skil; M. A. On computation of the rotation of a vector field on the n-dimensional sphere. Dokl. Akad. Nauk SSE (N.S.) 101 (1955), 401-404. (Russian) Let U be a periodic homeomorphism of the Euclidean n-sphere S onto itself with period $\hat{\rho}$, so that $U^px=x$ for $x \in S$. Let γ_U be the degree of the mapping U . Let V be a periodic homeomorphism of Euclidean $(n+1)$ -space R^{n+1} onto itself, the degree of which is γ_V and the period of which is q , with $\hat{\rho}$ divisible by q and $ Vx = x $ for $x \in R^{n+1}$. The author's main result is as follows: Suppose none of the mappings U^1 , \dots , U^{n-1} has a fixed point. Let Φ and Ψ be continuous vector fields without null vectors on S^n , satisfying the conditions $\Phi Ux = V\Phi x, \Psi Ux = V\Psi x \ (x \in S^n).$ Then $y = \gamma_V$ if $\gamma_U y = -1$, and $\gamma_U = \gamma_V$ (mod p) if	KRASNOSELSKIY	M-A-		
$\Phi U x = V \Phi x, \Psi U x = V \Psi x (x \in S^n).$		a vector field on the n-dimensional sphere. Doki. Addi-Nauk SSSR (N.S.) 101 (1955), 401-404. (Russian) Let U be a periodic homeomorphism of the Euclidean n-sphere S ⁿ onto itself with period p, so that U ^p x=x for x ε S ⁿ . Let γυ be the degree of the mapping U. Let V be a periodic homeomorphism of Euclidean (n+1)-space R ⁿ⁺¹ onto itself, the degree of which is γν and the period of which is q, with p divisible by q and Vx = x for x ε R ⁿ⁺¹ . The author's main result is as follows: Suppose none of the mappings U ¹ , ···, U ^{p-1} has a fixed point. Let G and Y be continuous vector fields without null	Ms .	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	V	$\Phi Ux = V\Phi x, \Psi Ux = V\Psi x (x \in S^n).$ Then $y_{\bullet} = y_{\bullet}$ if $y_{0}y_{0} = -1$, and $y_{\bullet} = y_{\bullet} \pmod{p}$ if $y_{0}y_{0} = 1$. J. M. Danskin (Princeton, N. J.).	Civil Park	







KRASNOSEL'SKIY, M.A.

USSR/MATHEMATICS/Integral equations SUBJECT

CARD 1/3

AUTHOR

BACHTIN I.A., KRASNOSEISKIJ M.A.

TITLE

To the problem on the longitudinal flexure of a beam of variable

flexural rigidity.

PERIODICAL

Doklady Akad. Nauk 105, 621-624 (1955)

raviewed 7/1956

The author uses the method of the non-linear functional analysis for the investigation of the longitudinal flexure of a thin beam of variable flexural rigidity which is fastened by a hinge. One end of the beam can move in the horizontal plane. The corresponding differential equation be

(1)
$$\frac{d^2y}{ds^2} = -P g(s)y \sqrt{1 - (\frac{dy}{ds})^2}$$

with the boundary conditions

$$y(0) = y(1) = 0$$

(P is the charge, g(s) the flexural rigidity, s the length of the curved beam, y the corresponding deviation from the equilibrium position). By

- Y(s) the solution of this equation can be reduced to the determination

Doklady Akad. Nauk 105, 621-624 (1955)

UARD 2/3

PG - 166

of $\psi(s)$ of the integral equation $\psi(s) = 28 \ \psi(s)$, where $\psi(s) = g(s) \int_{0}^{1} g(s,t) \psi(t) dt \left(1 - \left(\int_{0}^{1} g'(s,t) \psi'(s) dt\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}$

and the determination of y(s) of

$$y(s) = \Delta \varphi(s) = \int_{0}^{\infty} Q(s,t) \psi(x) dt$$

$$G(s,t) = \begin{cases} s(1-t) & \text{for } s \leq t \\ t(1-s) & \text{for } t \leq s. \end{cases}$$

The operator B is considered on the sphere TrC (C the space of the functions being continuous on [0,1]) of radius 1/2. It is complete on T and differentiable according to Frechet, where its Frechet's derivative in the zero point of the space is the operator $D\varphi(s) = g(s) \wedge \varphi(s)$. If $0 \le \varphi(s) \le \frac{1}{2}$, then $\mathbb{E}\left[t \varphi(s)\right] \ge t\mathbb{E}\left[\varphi(s)\right] = (0 \le t \le 1)$. If $\psi_1(s) \ge \psi_2(s) = (0 \le t \le 1)$, then there exists an ∞ such that $\mathbb{E}\left[\varphi_1(s) - \mathbb{E}\left[\varphi_2(s)\right] \ge c\varphi(s) \right] = (1-s)$. The charge \mathbb{P}_0 is called critical if for arbitrary $\mathbb{E}[\varphi(s)] > 0$ there exists a

Doklady Akad. Nauk 105, 621-624 (1955)

CARD 3/3

PG - 166

solution of (1)-(2) being different from zero, which satisfies the inequation $|y(s)| < \varepsilon$ if at the same time $|P-P_0| < \delta$. The critical forces of the considered problem agree with the eigenvalues $P_{\mathbf{k}}$ of the boundary value problem

$$\frac{d^2y}{ds^2} = P g(s)y y(0) - y(1) = 0.$$

The investigation of the question, when (1)-(2) admits small solutions, yields the theorem: For critical charges P_k (k=1,2,...) the equation $\varphi(s) = PB \varphi(s)$ has no small solutions being different from zero. To every $P_{\mathbf{k}}$ there corresponds an interval $\Delta_k = (P_k, P_k + h_k^2)$ such that for $P \in \Delta_k$ the equation $\varphi(s) = PB \varphi(s)$ has solutions being different from zero, which for P \rightarrow P tend to zero together with their second derivatives. The proofs of the theorems and lemmas are sketched.

INSTITUTION: Public University Voronez.

KRASNOSELSKIY, M.A. Call Nr: AF 1108825 Transactions of the Third All-union Mathematical Congress (Cont.) Moscow, Jun-Jul '56, Trudy '56, V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp. Krasnosel'skiy, M. A. (Voronezh). On the Investigation of Bifurcation Points of Non-linear Equation. 204-205 Kreyn, S. G. (Voronezh). Mathematical Problems in the Theory of Motion of Solid Bodies With Fluidfilled Cavities. 205 Kupradze, V. D. (Tbilisi). On Some New Research at the University of Tbilisi in the Mathematical Theory of Elasticity. 205 Mikhaylov, G. K. (Moscow). Precise Solution of a Problem on Stabilized Motion of Ground Water in Vertical Plane With Free Surface and Feeding Zone. 205-206 Mention is made of Polubarinova-Kochina, P. Ya. Movchan, A. A. (Moscow). Linear Oscillations of a Plate Moving in Gas at High Velocity. Card 68/80 206

KRASNOSEL'SKIY M.A.

SUBJECT

USSR/MATHEMATICS/Functional analysis CARD 1/1 PG - 544

AUTHOR

KRASNOSEL'SKIJ M.A.

TITLE

Topological methods in the theory of non-linear integral

equations. (Modern problems of mathematics).

PERIODICAL

Moscow: State Publication for technical-theoretical literature

392 p. (1956) reviewed 1/1957

In the present book the author compiles most of the researches on the non-linear analysis in the Banach spaces, researches combined essentially with the method of Leray-Schauder. The book contains six chapters. In the first chapter the author studies the integral operators to which the abstract methods in the following chapters are applied. The second chapter contains the notions and the fundamental theorems: The rotation of vector fields (in the sense of the author being equivalent to the topological degree of Leray-Schauder), the theorems of Brouwer, Hopf, Leray-Schauder, Kusternik-Snirel'-man-Borsuk.

The notions and theorems of the combinatoric topology used in this theory are deduced partially. Then (Chapter III and IV) these methods are applied to more concrete problems: the existence of solutions and proper values, ramification points, non-linear spectral analysis (the author defines a resolvent for non-linear operators), asymptotically linear operators, Liapunov theorems.

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CIA-RDP86-00513R000826120

SOV/124-57-4-3911

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 4, p 11 (USSR)

AUTHOR: Krasnosel'skiy, M. A.

TITLE: On the Investigation of Points of Forking of Nonlinear Equations (Ob

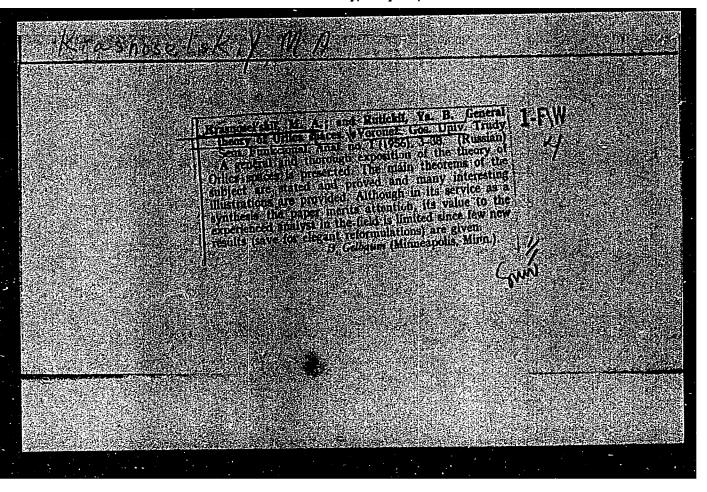
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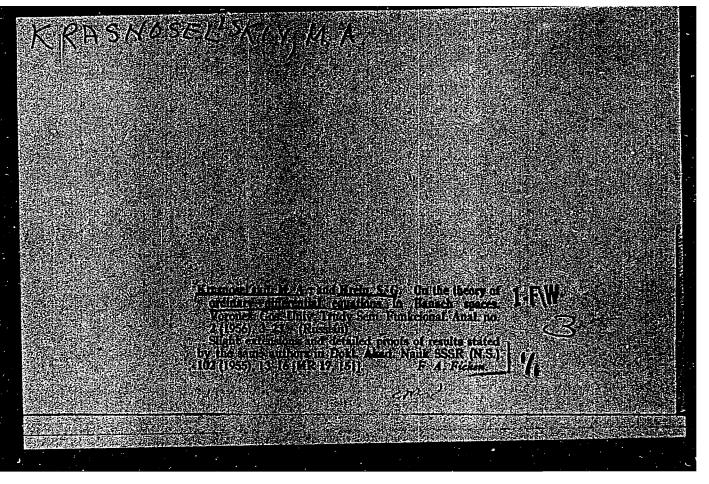
PERIODICAL: Tr. 3-go Vses. matem. s"yezda. Vol I. Moscow, AN SSSR, 1956,

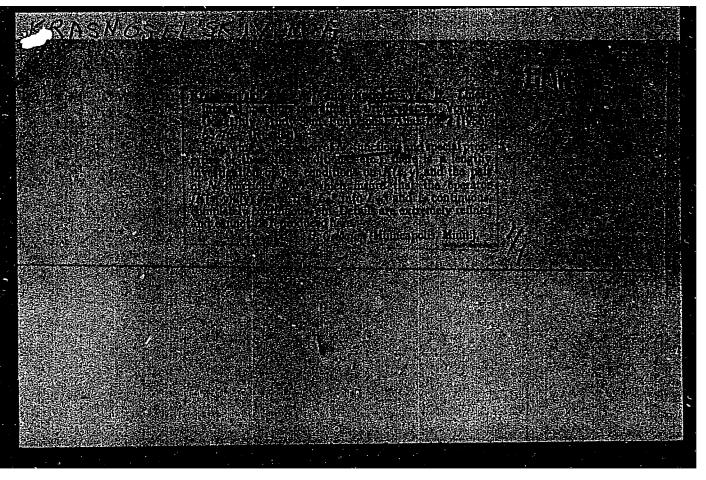
pp 204-205

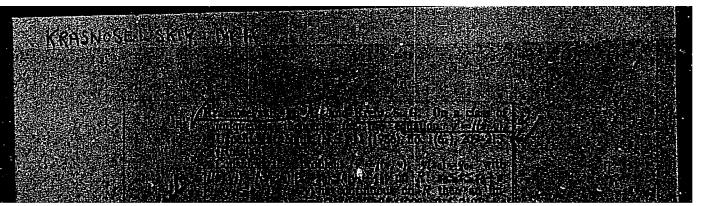
ABSTRACT: Bibliographic entry

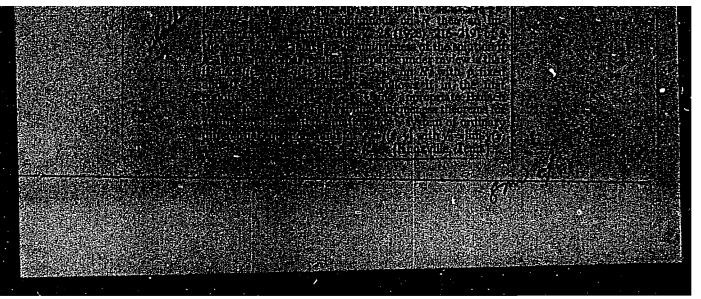
Card 1/1











KRASNOSEL'SKIY, M.A.

SUBJECT.

USSR/MATHEMATICS/Theory of approximations CARD 1/1 PG -

AUTHOR TITLE KRASNOSEL'SKIJ M.A.
On some approximative methods for the determination of the

on some approximative methods to the definite matrix. eigenvalues and eigenvectors of a positive definite matrix.

PERIODICAL Uspechi mat. Nauk 11, 3, 151-158 (1956)

reviewed 12/1956

The author proposes some methods for the approximative computation of the eigenvalues and eigenvectors of a positive definite, quadratic, symmetric matrix of n-th order. The matrix is considered as an operator in the \mathbf{E}^n . The proposed methods are analytic analogues to the well-known methods for the construction of point sequences \mathbf{x}_k (k=0,1,2,...) on the ellipsoid

(Ax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Ax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the endpoint of one of the semiaxes. Compare (Eax,x) = 1 which converge to the endpoint of one of the end

KRASNOSKLISKIY, M.A., SCHOLEY, V.I.

The Voronesh Seminar on functional analysis. Usp.mat.nauk 11 no.5: 249-250 S-0 '56. (MLRA 10:2) (Voronesh-Functional analysis)

KRASNOSEL'SKIY, M.A.

SUBJECT

USSR/MATHEMATICS/Functional analysis

CARD 1/1

PG - 410

AUTHOR

KRASNOSEL'SKIJ M.A.

TITLE

On a boundary value problem.

PERIODICAL

Izvestija Akad. Nauk 20, 241-252 (1956)

reviewed 12/1956

For the non-linear boundary value problem

$$y'' = f(x,y,y')$$

$$y(0) = y(\pi) = 0$$

the author gives new conditions for the existence of the solution. If the boundary value problem possesses a trivial solution, the author gives conditions for the existence of a second, non-vanishing solution. Nethods of the functional analysis are used.

"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000826120

KRASNOSEL'SKIY, M.A.

USSR/MATHEMATICS/Integral equations SUBJECT

CARD 1/3 PG - 368

AUTHOR

KRASNOSEL'SKIJ M.A.

TITLE

On the equations of A.I.Nekrasov of the theory of surface waves

of a heavy liquid.

PERIODICAL Doklady Akad. Nauk 109, 456-459 (1956)

reviewed 11/1956

Nekrasov has shown that the non-vanishing solutions of the integral equation

 $\varphi(x) = M \int_{0}^{2\pi} \frac{K(x,y)\sin \varphi(y)}{1 + M\sin \varphi(t) dt} dy$ (1)

 $K(x,y) = \sum_{n=1}^{\infty} \frac{\sin nx \sin ny}{n}$

determine the form of the waves on the surface of a heavy liquid. Here the positive eigenvalues Mn are different in dependence of the fact if the depth is finite or infinite. The papameter M is determined by the characteristics of the stream. The author applies methods of the functional analysis and topological considerations in order to investigate the solutions of this integral equation without constructing the solution. The initial point of the investigation is the statement that the operator

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R0008261200

Doklady Akad. Nauk 109, 456-459 (1956)

CARD 2/3

PG - 368

$$A(\varphi, \mu) = \mu \int_{0}^{2\pi} \frac{K(x,y) \sin \varphi(y)}{1 + \mu \int_{0}^{y} \sin \varphi(t) dt} dy$$

is completely continuous on a sufficiently small sphere of functions being continuous on $[0,2\pi]$, and admits the representation

 $A(\varphi, M) = MB\varphi + C(\varphi, M) + D(\varphi, M)$

Here B is a linear integral operator which is determined by the kernel K(x,y),

$$C(\varphi, M) = -M^2 \int_0^{2\pi} K(x, y) \varphi(y) \left[\int_0^y \varphi(t) dt \right] dy$$

and $D(\varphi, \nearrow)$ is of higher order than $C(\varphi, \nearrow)$ in φ . Now from an earlier result of the author follows that (1) possesses small non-vanishing solutions for certain \nearrow , which lie in the neighborhood of each \nearrow _n. In order to find these \nearrow -values the author applies very interesting topological considerations (see: Bachtin and Krasnosels'kij, Doklady Akad. Nauk 105, 4, (1955)) which

Poklady Akad. Nauk 109, 456-459 (1956)

CIA-RDP86-00513R00082

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513 lead to the theorems which reduce the computation to a minimum at the applications. The capable application of these methods enables the author to make very useful assertions on the distribution, existence, uniqueness similar ones.

KRASNOSEL SKIY, M.A.

BUBJECT AUTHOR

PG - 711 CARD 1/3 USSR/MATHEMATICS/Functional analysis

KRASNOSEL'SKIJ M.A., KREJN S.G., SOBOLEVSKI P.E.

On differential equations with bounded operators in Banach spaces.

TITLE Doklady Akad. Nauk 111, 19-22 (1956) PERIODICAL

reviewed 4/1957

The authors consider the equation

(1)
$$\frac{dx}{dt} = A(t)x + f(t,x),$$

where x(t) is the sought function with a range of values in the Banach space E, A(t) and f(t,x) are operators in E and besides A(t) is unbounded, closed and linear for every t. A solution is sought which satisfies the initial condition

$$\mathbf{x}(0) = \mathbf{x}_{0},$$

where x belongs to the region of definition D(A) of the operator A(0). The authors use the theory of semigroups and therefore it is assumed that A(t) is the generating operator of a strongly continuous semigroup of bounded operators $T(\xi)$ ($\xi > 0$) for every t. At first the linear equation

$$\frac{dx}{dt} = Ax + f(t)$$

is considered, where A is independent of t. Let Q be the linear operator

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R0008261200

Doklady Akad. Nauk 111, 19-22 (1956)

CARD 2/3

PG - 711

$$Qx(t) = \int_{0}^{t} T(t-x)x(T)dT.$$

Theorem: a) Q acts and is continuous in the space C_L of functions which satisfy the Lipschitz condition. If for $\xi > 0$ the semigroup $T(\xi)$ is continuous with respect to the norm (condition C_n according to Hill), then Q acts from C_L to C_1 and is continuous. b) if A^{-1} is completely continuous, then Q as an operator from C_L to C is completely continuous too. Theorem: Let $T(\xi)$ satisfy the condition C_n and let f(t) be continuous and have a strongly bounded variation. For $x_0 \in D(A)$ the formula

$$x(t) = T(t)x_0 + Qf(t)$$

yields the solution of (1)-(2). Let be given a homogeneous linear equation $\frac{dx}{dt} = A(t)x$ and let be satisfied the condition α) $C(t) = A(t) \frac{d}{dt} A^{-1}(t)$ bounded and strongly continuous in t. Theorem: If α is satisfied, then 1) the operators A(t) have a common region

Doklady Akad. Nauk 111, 19-22 (1956)

CARD 3/3

PG - 711

of definition, 2) the operators $B(t,s) = A(t)A^{-1}(s)$ are continuous with respect to the norm in t and s and 3) the derivative $\frac{\partial B(t,s)}{\partial t}$ is strongly continuous

for every s in t.

If 1) and 3) are satisfied, then α) is satisfied too. This theorem and a further one are incdirect connection with the investigations of Kato (J.Math.Soc.Jap. 5. no.2, (1953)).

2. no.2, (1977). Then the non-linear equation (1) is treated. A generalized solution of (1)-(2) means a function x(t) which satisfies the operator equation

(3)
$$x(t) = Qf \left[t, x(t)\right] + U(t, 0)x_0.$$

For the proof of the theorems of existence theorems of fixed points are used. For a sufficient smoothness of f(t,x) in some cases it can be shown that the generalized solutions the existence of which was proved, are ordinary solutions of (1). Some examples are considered.

KRASNOSELSKY, M.A. KRASNOSELSKY M.A.

SUBJECT

USSR/MATHEMATICS/Functional analysis

CARD 1/2

PG - 612

AUTHOR

KRASNOSEL'SKI M.A.

TITLE

On the application of the methods of non-linear functional analysis to some problems on periodic solutions of equations of non-linear

mechanics.

PERIODICAL Doklady Akad. Nauk 111, 283-286 (1956)

reviewed 2/1957

With means of non-linear functional analysis the following questions of nonlinear mechanics are treated: Existence of periodic solutions, uniqueness of them, dependence of these solutions on the parameters of the right side of an equation etc. The starting point of the considerations is the statement that to every system of ordinary differential equations there can be associated an equation with a completely continuous operator such that the solutions of this equation only determine the periodic solutions of the system. By aid of theorems on fixed points the author obtains sufficient conditions for the existence of periodic solutions. E.g. let be given the system

(1)
$$\ddot{x}_i + g_i(t, x_1, ..., x_n, \dot{x}_1, ..., \dot{x}_n) = 0$$
 (i=1,...,n),

where the g_i are continuous and possess the period 2π in t. If the condition

(2)
$$\sum_{i=0}^{n} x_i g_i(t, x_1, \dots, x_n; y_1, \dots, y_n) \le a \sum_{i=1}^{n} x_i^2 + b \sum_{i=1}^{n} |y_i|^{2-y} + c$$

"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000826120

Doklady Akad. Nauk 111, 283-286 (1956)

CARD 2/2

PG - 612

with $0 < \gamma < 2$; a,b,c - numbers and a <0 is satisfied, then (1) has at least one periodic solution. If besides the g_i satisfy the condition

$$g_{1}(-t,-x_{1},...-x_{n},y_{1},...y_{n}) = -g_{1}(t,x_{1},...,x_{n},y_{1},...y_{n})$$

or

$$\varepsilon_{1}(t+\pi,-x_{1},\ldots,-x_{n},-y_{1},\ldots-y_{n}) = -\varepsilon_{1}(t,x_{1},\ldots,x_{n},y_{1},\ldots,y_{n}),$$

then for the existence of a periodic solution the condition (2) with a ≤ 1 is sufficient.

Further theorems relate to systems

$$\ddot{x}_i + g_i(x_1, ..., x_n; \dot{x}_1, ..., \dot{x}_n) = 0$$
 and $\ddot{x}_i + g_i(x_1, ..., x_n) = 0$.

INSTITUTION: University, Vorone .

SUBJECT

USSR/MATHEMATICS/Topology

CARD 1/2

PG - 752

AUTHOR TITLE

111.11.

KRASNOSEL'SKI M.A.

On a possible generalization of the method of orthogonal

trajectories.

PERIODICAL

Uspechi mat. Nauk. 12, 1, 160-162 (1957)

reviewed 5/1957

According to the topological method of Ljusternik-Snirel man the number of critical points of the functionals $\phi(x)$ being defined on the space R can be estimated by constructing certain continuous deformations % (x,t) which have the property that for increasing t the expressions $\phi[\varkappa(x,t)]$ in all non-critical points x increase too. The deformations \varkappa are determined by motions along the integral curves of

$$\frac{dx}{dt} = \text{grad } \phi(x)$$
.

These are orthogonal to the equipotential surfaces of $\Phi(x)$. The author proposes a further development of this method of orthogonal trajectories. Therefore he generalizes the notion of the continuous deformation: a family of closed connected sets $\{F(x_0,t)\}\ (0 \le t \le 1)$ is called a generalized continuous deformation of the point $x_0 \in R$ if $F(x_0, 0)$ consists of one point x_0 and if

Uspechi mat. Nauk 12, 1, 160-162 (1957)

$$\lim_{t_1 \to t_2} d \left[F(x_0, t_1); F(x_0, t_2) \right] = 0,$$

where d(A,B) is the Hausdorff distance between the sets A and B. The family $\{F(x,t)\}$ of deformations of the points $x\in G$ forms a generalized continuous deformation of the set GCR if for every connected set $G_1\subset G$ the sets

 $\bigcup F(x,t)$ are connected for all t and if $x \in G_4$

$$\lim_{t_1 \to t_2} d \left[\underset{x \in G_1}{\bigcup} F(x,t_1); \underset{x \in G_1}{\bigcup} F(x,t_2) \right] = 0.$$

Starting from this definition the author proposes a systematic development of the generalized method of the orthogonal trajectories. Several questions are not answered; concrete results are not given.

KRASNOSEL'SKIY, M.A.

SUBJECT

USSR/MATHEMATICS/Functional analysis

CARD 1/2 PG - 806

AUTHOR TITLE

KRASNOSEL'SKIJ M.A.

Investigation of the spectrum of a non-linear operator in the neighborhood of the bifurcation point and application to the

problem on the longitudinal bend of a compressed bar.

PERIODICAL

Uspechi mat. Nauk 12, 1, 203-208 (1957)

reviewed 6/1957

By the example of a compressed bar the author demonstates the application of topological methods in the bifurcation theory of small solutions. The contents of the present note in essential is contained in the author's book "Topological methods in the theory of non-linear integral equations" (1956). Interesting questions are given and partially answered. Let A be a non-linear completely continuous operator in the Banach space E, let A9 = 9. Then

has a solution θ for all λ . The number $\lambda_0 \neq 0$ is called bifurcation point of Aif to every $\varepsilon>0$ there corresponds a λ such that $|\lambda-\lambda_0|<\varepsilon$, to the there corresponds a solution of (1) being different from 9 and if $\|\gamma\| < \epsilon$. Let A be sufficiently smooth and permit the representation A = B+C+D, where B is a linear operator,

Uspechi mat. Nauk 12, 1, 203-208 (1957)

$$c(\alpha \varphi) = \alpha^k c \varphi \; ; \; \|c \varphi_1 - c \varphi_2\| \leq \mathtt{M} (\, \| \, \varphi_1 \, \| \, + \, \| \, \varphi_2 \| \,)^{k-1} \; \| \, \varphi_1 - \, \varphi_2 \|$$

and

$$\lim_{\|\phi\| \to 0} \| \| \phi \| \cdot \| \| \phi \|^{-k} = 0.$$

For what maximal class of operators A the set of bifurcation points of A is identical with the set of characteristic values of B? Two partial results are given: 1) If A is the gradient of a weakly continuous functional, then the sets are identical; 2) Every characteristic value λ_0 of B with

an odd multiplicity is a bifurcation point of A. Furthermore the question is treated for which λ the equation (1) has small solutions \neq 0.

KRASNOSEL'SKIY, M.A.; KREYN, S.G.; MYSHKIS, A.D.

والمدارية والمراجع والمراجع والمتعارض والمتعار

The broadened sessions of the Voronezh Seminar on Functional Analysis in March 1957. Usp.mat.nauk 12 no.4:241-250 J1-Ag '57. (MIRA 10:10)

(Voronesh -- Functional analysis)

The decomposition of linear operators. Usp.mat.nauk 12 no.4:313-317

J1-Ag '57...

(Operators (Mathematics))

KRASNOSEL'SKIY, M.A.

SUBJECT UJSR/MATHEMATICS/Functional analysis CARD 1/3 PG - 874

AUTHOR KRASNOSEL'SKIJ M.A., KREJN S.G., SOBOLEVSKIJ P.E.

TITLE On differential equations with unbounded operators in the

Hilbert space.

PERIODICAL Doklady Akad. Nauk 112, 990-993 (1957)

reviewed 6/1957

Joining a paper of Kato (J. M ath.Soc.Japan, 5, 2, (1953)) the authors investigate the equation

(1)
$$\frac{dx}{dt} + A(t)x = f(t)$$

in the Hilbert space H. Kato constructed the solution of (1) in the Banach space in the form

(2)
$$x(t) = \overline{u}(t,0)x_0 + Qf(t),$$

where the solution of the homogeneous equation has the form

$$x(t) = v(t,s)x_0$$

with a continuous and bounded operator U(t,s) and with the initial condition

Doklady Akad. Nauk 112, 990-993 (1957)

CARD 2/3

PG - 874

$$x(s) = x_0$$
 and $Qt(t) = \int_0^t U(t,s)f(s)ds$.

In the special case considered by the authors, about U and Q more exact assertions can be made. Here it is assumed that 1) A(t) is selfadjoint and $(A(t)x,x)\geqslant (x,x)$, 2) for $0\le \alpha\le 1$, $A^{-\alpha}(t)$ is differentiable, where $C_{\infty}(t)=A^{\alpha}(t)\frac{d}{dt}A^{-\alpha}(t)$ are uniformly bounded with respect to α and α . 3) $C_1(t)$ is strongly continuous in t and bounded. It is shown that under certain conditions of 1) and 3) there follows the condition 2). Furthermore: $x(t)=U(t,s)x_0$ satisfies the homogeneous equation for all $x_0\in H$. For $x_0\in H$ and $x_0\in H$ are bounded, where $x_0\in H$ and $x_0\in H$ are bounded, where $x_0\in H$ are bounded, where

Doklady Akad. Nauk 112, 990-993 (1957)

CARD 3/3

PG - 874

of (1) for all $x_0 \in \mathbb{H}$ and t > 0. If x_0 lies in the region of definition of A, then this solution has the property $\|A^{\alpha}(t) \frac{dx}{dt}\| \leq \|\|t\|^{-\alpha}$ for $\alpha < \xi$. Let C be the space of the functions f(t) being continuous on [0,b] with the values in H and the norm $\|f\|_C = \max \|f(t)\|$ and let C' be the space of continuous differentiable functions which vanish for t = 0 and the norm of which is $\|f\|_{C'} = \max \|f'(t)\|$. If $f(t) \in C$, then it holds $\|f\|_{C'} = \max \|f'(t)\| = \|f(t)\| \leq \|f\|_{C'}$,

if $f(t) \in C_0'$, then we have $\left\| \frac{d}{dt} \, Qf(t+\Delta t) - \frac{d}{dt} \, Qf(t) \right\| \leq K_2 \Delta t \left| \ln \Delta t \right| \cdot \left\| f \right\|_{C_0'}.$

If $A^{-1}(t)$ is completely continuous, then Q is completely continuous in C and C_0^{\dagger} . Furthermore the equation (3) $\frac{dx}{dt} + A(t)x = f(t,x)$ is considered. It is stated that the integral equation (4) $x(t) = U(t,0)x_0 + Qf[t,x(t)]$ has a solution on a certain interval. If $\|f(t+\Delta t,x+\Delta x)-f(t,x)\| \leq K(|\Delta t|^{\alpha}+\|\Delta x\|^{\alpha})$ ($\alpha \leq 1$), then every continuous solution of (4) is also a solution of (3) for t > 0.

KRASNOSEL'SKIR M.A.

AUTHOR:

KHASHOSEL'SKIY, M.A.

20-2-5/50

TITLE:

On Periodic Solutions in the Neighborhood of the Singular Point of a Dynamic System (O periodicheskikh resheniyakh v okrestnosti osoboy tochki dinamicheskoy sistemy)

Doklady Akademii Nauk 1957, Vol 117, Nr 2, pp 180-183 (USSR)

PERIODICAL:

Under the supposition

ABSTRACT:

(1) $g_i(-x_1,...,-x_n, y_1,..., y_n) = -g_i(x_1,..., x_n, y_1,..., y_n)$

the author considers the systems

(2) $\dot{x}_i + g_i (x_1, ..., x_n, \dot{x}_1, ..., \dot{x}_n) = 0 \quad (i = 1, ..., n)$

He investigates periodic solutions with small amplitudes and the dependence of the amplitudes on the period. The obtained results are based on the author's non-linear functional-analytical investigations and on his theorems on the bifurcation points [Ref.1,3,4]. On the whole there are formulated seven

theorems without proof, e.g.:

Let C denote a matrix of order n with the elements

 $e_{ij} = \frac{\partial}{\partial x_i} g_i (0,...,0,0,...,0)$ (i,j = 1,...,n).

Card 1/3

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R0008261200

On Periodic Solutions in the Neighborhood of the Singular 20-2-5/50 Point of a Dynamic System

Definition: The set N of periodic solutions of (2) is said to have limit-period T, if the periods of solutions in N tend to T in the case that their amplitudes go to zero. Theorem: Let 100 be a positive root of the character-equation of C and have an odd multiplicity. The sum of the multiplicities of the other positive roots which possess the property that

 $\frac{4\sqrt{\mu^2}}{T_k^2}$ is an integral multiple of them is assumed to be even. Then an infinite set \mathcal{H}_k of periodic solutions of (2) with the limit period T_k corresponds to the root $\frac{4\sqrt{\mu^2}}{T_k^2}$.

period T_k corresponds to the root $\frac{4\tilde{n}^2}{T_k 2}$.

Theorem: Let the system $\tilde{x}_i + g_i(x_1, \dots, x_n) = 0$ ($i = 1, \dots, n$), $g_i(-x_1, \dots, -x_n) = -g_i(x_1, \dots, x_n), g_i(x_1, \dots, x_n) = \frac{\partial}{\partial x_i} C(x_1, \dots, x_n)$ ($i = 1, \dots, n$), be given. To each positive root $\frac{2\tilde{n}^2}{T_1 2}$ of the

characteristic equation of C there corresponds a set \mathcal{X}_k of periodic solutions of (2) with the limit-period \mathbf{T}_k ,

Card 2/3

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120

• On Periodic Solutions in the Neighborhood of the Singular 20-2-5/50 Point of a Dynamic System

5 Soviet and 1 foreign references are quoted.

ASSOCIATION: Voronezh State University (Voronezhskiy gosudarstvennyy

universitet)

PRESENTED: By N.N. Bogolyubov, Academician, 30 May, 1957

SUBMITTED: 21 May, 1957

AVAILABLE: Library of Congress

Card 3/3

AUTHOR: KRASNOSEL'SKIY, M.A., RUTITSKIY, Ya.B. 20-3-2/52 On Some Nonlinear Operators in the Orlicz Spaces (O nekotorykh TITLE:

nelineynykh operatorakh v nrostranstvakh Urlicha)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 117, Nr. 3, pp. 363-366 (USSR)

ABSTRACT: Let the function f(x,n) $(x \in C, -\infty < u < \infty)$ satisfy the conditions of Caratheodory. Let the operator F be defined by Fu(x) = f[x,u(x)]. The authors give conditions under which in a sphere of the

Orlicz-space $L_{\mathbf{u}}^{*}(G)$ this operator is differentiable according to

Frechet. Further the operator $K\varphi(x) = \int K[x,y,\varphi(y)] dy$ is

considered. It is shown that under certain conditions it is completely continuous; here the operator may possess also essential non-potential nonlinearities. Conditions are given under which there exists an Orlicz-space in which K is defined and completely continuous. Further the question of the differentiability of the norm in Orlicz-spaces is considered. The results can be extended also to the modulated spaces

considered by Nikano. The paper contains six long theorems Card 1/2

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000826120(

On Some Nonlinear Operators in the Orlicz Spaces

20-3-2/52

without proofs.

One Soviet and 2 foreign references are quoted.

ASSOCIATION: Voronezh State University (Voronezhskiy gosudarstvennyy

universitet)

PRESENTED: By P.S. Aleksandrov, Academician, 30 May 1957

SUBMITTED: 30 May 1957

AVAILABLE: Library of Congress

16(1)

PHASE I BOOK EXPLOITATION

SOV/1455

Krasnosel'skiy, Mark Aleksandrovich, and Yakov Bronislavovich Rutitskiy

Vypuklyye funktsii i prostranstva Orlicha (Convex Functions and Orlicz Spaces) Moscow, Fizmatgiz, 1958. 271 p. (Series: Sovremennyye problemy matematiki) 5,000 copies printed.

Ed.: M.M. Goryachaya; Tech. Ed.: V.N. Kryuchkova,

PURPOSE: This book is intended for mathematicians, senior students, aspirants, and scientific workers concerned with functional analysis and its applications, and also with various problems of the theory of functions.

COVERAGE: This book is one of a series entitled Sovremennyye problemy matematiki (Modern Mathematical Problems), published under the supervision of the editorial staff of the Journal Uspekhi matematicheskikh nauk. The book presents the theory of many classes of convex functions and its applications. The material for this theory is taken from various mathematical papers. The general theory of Orlicz spaces is developed, and its applications to the

Card 1/8

11

Convex Functions and Orlicz Spaces

SOV/1455

study of operators, functionals and nonlinear integral equations are presented. The authors thank G.Ye. Shilov for his assistance in preparing the book. There are 104 references, 72 of which are Soviet, 16 English, 11 German, 3 French, and 2 Italian.

TABLE OF CONTENTS:

Preface 8

Ch. I. Special Classes of Convex Functions
1. N - functions
Convex functions. Representation of convex function
in the form of an integral. Definition of N - function.
Properties of N - functions. Second definition of
N - function. Superposition of N - functions

2. Complementary N - function
Definition. Young's inequality. Examples. Inequality
for complementary functions

Card 2/8

3. Comparison of N - functions Definition. Equivalent N - functions. Principal part	26
of N - function. On equivalence test. Existence of various classes 4. Δ ₂ -condition Definition. Tests of Δ ₂ -conditions. Δ ₂ -condition for	35
complementary N - function. Examples 5. \triangle ' - condition Definition. Sufficient tests under which \triangle ' - condition is satisfied. \triangle ' - condition for complementary function.	43
6. N - functions which increase faster than power functions. \$\int \text{\Delta}_{3}\$- condition. Evaluations for complementary function.	; 49
Superposition of complementary functions. Δ^2 condition. Properties of complementary functions. Test of Δ^2 condition for complementary function. Further remarks on superpositions of N - functions	
rd 3/8	

	x Functions and Orlicz Spaces SOV/1455 On one class of N - functions Statement of problem. Wiclass. W class. Theorem concerning complementary function	88
Ch. I	I. Orlicz Spaces Orlicz classes Definition. Jensen's integral inequality [inequality in the form of integrals]. Comparison of classes. On the structure of Orlicz classes	
9.	Space L*M Norm according to Orlicz. Completeness. Norm of characteristic function. Hölder inequality. The case	83
10.	of Δ_2 -condition. Mean convergence. Luxemburg's norm Space E_M Definition. Separability E_M . Location of the class L_M relative to space E_M . Necessary condition for separability of Orlicz spaces. On the definition of a norm. Absolute continuity of a norm. Calculation of a norm. Another formula for a norm	98

Convex Functions and Orlicz Spaces SOV/1455 11. Compactness tests Theorem of Vallée-Poussin. Steklov's function. Kolmogorov's compactness test for Em spaces. Second compactness test. F. Riesz's compactness test for space Em 1	112	
12. Existence of a base Passage to a space of functions defined in an interval. Haar function. Base in Em . Further remarks on the separa- bility condition	120	
13. Spaces defined by various N - functions Comparison of spaces. Inequality for norms. On one test of convergence in norm. Product of functions from Orlicz space. Sufficient conditions	130	
14. Linear functionals Linear functionals in L [*] M. General form of a linear functional on E _M . E _N - weak convergence. E _N - weakly continuous linear functionals. Norm of a functional and \v \(\nabla\) (N)	146	
Card 5/8		

Convex Functions and Orlicz Spaces SOV/1455 Ch. III. Operators in Orlicz Space		
 15. Continuity conditions of linear integral operators Statement of problem. General theorem. Existence of a function Φ (u). On one property of N - functions which satisfy the Δ'- condition. Sufficient continuity conditions. Decomposition of a continuous operator 16. Conditions of a complete continuity of linear integral 	159	
The case of continuous kernels. Fundamental theorem. Complete continuity and E _N ~ weak convergence. Zaanen's theorem. Comparison of conditions. On the decomposition of complete continuous operator. On operators of potential type	173	
17. The simplest nonlinear operator Condition of Caratheodory, Definition domain of operator f. Continuity theorems. Boundedness of operator f. General form of operator f. Sufficient conditions of continuity and boundedness for operator f. Operator f and EN - weak convergence	1 9 3	
18. Differentiability. Gradient of a norm Differentiable functionals. Measurability of function $(\Theta)(x)$	203	
Card 6/8		2

Convex Functions and Orlicz Spaces

SOV/1455

Functionals for operator f. Linear operator f. Fréchet derivative. Special differentiability condition. Auxiliary lemma. Gateaux gradient. Gradient of Luxemburg norm. Gradient of Orlicz norm

Ch. IV. Nonlinear Integral Equations

19. P.S. Uryson's operator
P.S. Uryson's operator. Boundedness of P.S. Uryson
operator. Reduction to a simpler operator. Second reduction to a simpler operator. Third reduction to a
simpler operator. Fundamental theorem on complete continuity
of P.S. Uryson's operator. The case of weak nonlinearities.

20. Certain existence theorems
Problems studied. Existence of solutions. Positive
eigenfunctions. Eigenfunctions of potential operators.
Theorem on bifurcation points

Summary of Basic Results

246

222

Card 7/8

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Convex Functions and Orlicz Spaces	SOV/1455	
Bibliographical Note		259
References		267
AVAILABLE: Library of Congress		
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	LK/jmr	
•	5-21-59	
Card 8/8		

KRASNOSEL'SKIY M.A.

PHASE I BOOK EXPLOITATION

1087

Moskovskoye matematicheskoye obshchestvo

Trudy, t. 7 (Transactions of the Moscow Mathematical Society, v. 7)
Moscow, Fizmatgiz, 1958. 438 p. 1,500 copies printed.

Editorial Staff: Aleksandrov, P.S.; Cel'fard, I.M. and Golovin, O.N.; Ed.: Lapko, A.F.; Tech. Ed.: Yermakova, Ye.A.

PURPOSE: This book presents original articles submitted to the Moscow Mathematical Society and is intended for specialists in various fields of mathematics.

COVERACE: Volume 7 contains 12 articles concerning problems in different fields of mathematics, including functional analysis, differential geometry and mathematical logic. All contributions in this volume are Soviet. Most of the articles deal with problems of functional analysis which reflect the present-day status and trend of this branch of mathematics.

Card 1/8

63

Transactions of the Moscow Mathematical (Cont.)

1087

TABLE OF CONTENTS:

Berezonskiy, Yo.M. (Kiyev). On the Uniqueness Theorem in the Enverse Problem of Spectral Analysis for the Schuddinger Equation The Postc results given in this acticle were presented at the November 9, 1959 session of the Masonw Mathematical Society. The article contains the following sections:

Introduction:

1.) Cerbain results concerning hyperbolic equations; 2) Proof of the Grigonyan Transcript, 3) Shows and of an inverse problem connected with the scattering of waven; References

Krasmoseliskiy, M.A. and Ratifiskiy, Ya.B. (Voroneth)

Orlich Spaces and Norlinear Integral Equations
The basic results given in this article were presented at the March 2, 1954 session of the Moscow Mathematical Society. The article contains the following sections: Introduction; 1) Basic definitions; 2) Splitting of linear

Cz.rd. 2/8

121

149

Transactions of the Moscow Mathematical (Cont.)

1087

integral operators; 3) Operator f; 4) Hammerstein operator; 5) OperatorG; 6) Differentiability of the Hammerstein operator; 7) Applications to theorems of the existence of solutions and to eigenfunctions; References.

Kornblyum, B.I. (Kiyev). Generalization of Wiener's Tauberian Theorem and Harmonic Analysis of Fast Increasing Functions

The basic results given in this article were presented at the April 23, 1954 session of the Moscow Mathematical Society. The article contains the following sections: 1) Introduction; 2) Theorem of Wiener type; 3) Lemmas on spaces $\lfloor (-\infty, \infty; d) \rfloor$ and $M(-\infty, \infty; d)$; 4) Lemmas on Fourier transformations; 5) Lemmas on functions analytic in a strip; 6) Proof of theorem I; 7) Ideals

 I_{γ}^{+} and I_{γ}^{-} ; 8) General Tauberian Theorems; 9) Theorem of Berling type; 10) Spectrum of fast increasing functions; References.

Ladyzhenskaya, O.A. (Leningrad). Solution of the First Boundary Value Problem on the Large for Quasilinear Parabolic Equations
The basic results given in this article were presented at the December 18, 1956 session of the Moscow Mathematical Society. The article contains the following sections: Introduction; Ch. I. A Priori Evaluations for the

Card 3/8

1087

Solutions of Problems (1) and (2); 1) Evaluation of the modulus of a solution; 2) Evaluation of first derivatives of u(x,t) with respect to xk in a closed region S_{ϵ} ; 3) Evaluation in the form of integrals of u derivatives contained in the equation; 4) Evaluation of the second order derivatives of u with respect to x in the interior of a region SC; 5) Evaluation of the third order derivatives of u with respect to x; 6) Evaluation of derivatives D_{tx}^2 u, D_{x}^4 u and D_{tx}^2 2 u;

Ch. II. Theorems on Existence and Uniqueness of a Generalized Solution of the Boundary Value Problem; 1) Construction of Approximate Solutions; 2) Evaluation of $| \text{grad } \mathbf{u}_h(\mathbf{x}, \mathbf{tp}) |$; 3) Evaluation of $\mathbf{p}^2_{\mathbf{x}} \mathbf{u}_h$ and \mathbf{u}_{ht} form of integrals; 4) Proof of the existence and uniqueness theorem of a generalized solution; Ch. III. Investigation of Differential Properties of a Generalized Solution. The Existence of a Classical Solution; References.

Ryzhkov, V.V. Conjugate Systems on Multidimensional Spaces The basic results given in this article were presented at the March 20, 1956 session of the Moscow Mathematical Society. This article contains

179

Card 4/8

1087

the following sections: Introduction; Ch.I. Conjugate Systems; 1) Designations and basic definitions; 2) Differential equation defining conjugate Systems; 3) Condition for complete stratification of a conjugate system; Ch. II. Completely Stratifiable Conjugate Systems; 4) n-tonjugate systems; 5) Conjugate Systems with one multidimensional component; 6) Completely stratifiable conjugate systems with several multidimensional components; 7) General remarks on complete stratifiable conjugate systems; References.

Fage, M.K. (Chernovitsy). Operationally Analytic Functions of One Independent Variable [Functions Defined by an Ordinary Linear Differential Operator L of an Arbitrary Order With Continuous Coefficients]

227
The basic results given in this article were presented at the October 30, 1956 session of the Moscow Mathematical Society. The article contains the following sections: Introduction; 1) L-bases; 2) L-analytic polynomials; 3) Taylor's L-formula; 4) Taylor's L-series; 5) L-holomorphic functions; 6) L-analytic functions. Uniqueness theorem; 7) Regularly convergent sequences of L-analytic functions; 8) Operator with analytic coefficients; 9) Local equivalency of operators of an equal order; 10) Cauchy problem in the region of double operationally holomorphic functions; References.

Card 5/8

1087

Levitan, B.M. Differentiation of Eigenfunction Expansion of the Schrödinger Equation

The basic results given in this article were presented at the October 4, 1955 session of the Moscow Mathematical Society. The article contains the following sections: Introduction; 1) Solution of Cauchy problem; 2) Evaluation for arbitrary sigenfunctions; 3) Evaluation of derivatives of eigenfunctions in the case of an infinite region; 4) Differentiation of eigenfunction expansion; 5) The case of $Q(x) \rightarrow Q(x) \rightarrow Q(x)$ References.

Men'shov, D.Ye. Limit Functions of a Trigonometric Series

The basic results given in this article were presented at the
April 16, 1957 session of the Moscow Mathematical Society. The article
contains the following sections: 1) Introduction. [Basic definitions and
formulation of three theorems]; 2) [Preliminary remarks, definitions and
aixiliary theorems needed to prove theorem II. Proof of theorem II[;
3) [Definitions and lemmas needed to prove theorem III]; 4) [Proof of
Theorem III;] 5) Derivation of theorem I from theorems II and III; References.

Grayev, M.I. Unitary Representations of Real Simple Lie Groups

This article was presented at the January 20, 1956 Session of the
All-Union Conference on Functional Analysis and its Applications. The
article contains the following sections: Introduction; 1) Gpq group; parameters and an invariant measure of Gpq group;

Card 6/8

1087

- 2) Generalized linear elements and transitive manifolds; 3) Discrete series of representations of type 1; 4) Irreducibility of representations of a discrete series; 5) Traces of representations of a discrete series; 6) Indiscrete basic series of unitary representations of G p, q group; References.
- Muchnik, A.A. Solution of Post's Reducibility Problem and of Certain Other Problems of the Magory of Algorithms. I. Basic results of the 390 article were presented at the October 16, 1956 session of the Moscow Mathematical Society. The article contains the following sections: Introduction; Ch. I. Functional Representation of Partially Recursive Operators; 1) Cortege and quasi-cortege; 2) Functional representations of operators; 3) Universal partially recursive operator; 4) Calculation [solution] of M [Medevedev] problems; Ch.II. Decision Problems of Enumerable Sets; I) Semilattices On (p); 2) Post's reducibility problem; References.

Michnik, A.A. Isomorphism of Systems of Recursively Enumerable Sets With Effective Properties

407

Card 7/8

1087

The basic results given in this article were presented at the December 17, 1957 session of the Moscow Mathematical Society. The article contains the following sections: 1) Introduction; 2) On the correspondence (reducibility) of systems of sets; 3) Effective inseparability; 4) Quasi-effective properties; References.

Raykov, D.A. Completely Continuous Spectra of Convex Spaces

Basic results given in this article were presented at the December 3, 1957 session of the Moscow Mathematical Society. The article contains the following sections Introduction; 1) Preliminary information and agreements of a general character; 2) Preliminary information on projective limits; 3) Preliminary information on inductive limits; 4) Spaces of type (S); 5) Spaces of type (S); 6) Spaces of type (S); 7)

Preliminary information from the theory of duality; 8) Conjugate mappings; 9) Duality of classes (N) and (S); 10) Nondegenerated spectra; References.

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Card 8/8

LK/fal 2-24-59

KRASNOSEL'SKIY, M.A.; RUTITSKIY, Ya.B. (Voronezh)

Orlicz' spaces and nonlinear integral equations. Trudy Mosk. mat. ob-va 7:63-120 '58. (MIRA 11:8)

(Functional analysis)

"APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120

AUTHOR:

Kolmogorov, A.N., Krasnosel'skiy, M.A. SOV/42-13-3-12/41

TITLE:

Mark Grigor'yevich Kreyn (on the occasion of his 50th birthday)

(Mark Grigor yevich Kreyn (K pyatidesyatiletiyu so dnya

rozhdeniya))

PERIODICAL: Uspekhi Matematicheskikh Nauk, 1958, Vol 13, Nr 3, pp 213-224 (USSR)

ABSTRACT:

This is a short biography and very detailed appreciation of the mathematical merits of the versatile and extraordinary intensively working mathematician Kreyn. It contains a photo of Kreyn and a chronological list of his scientific publications with 151

number: (from 1926 to 1958).

Card 1/1

AUTHORS:

Krasnosel'skiy, M.A. and Pustyl'nik, Ye.I. SOV/20-122-6-6/49

TITLE:

The Use of Fractional Powers of Operators in the Study of a Fourier Series by the Eigen Functions of Differential Operators (Ispol'zovaniye drobnykh stepeney operatorov pri izuchenii ryadov Fur'ye po sobstvennym funktsiyam different-

sial'nykh operatorow)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 6, pp 978-981 (USSR)

ABSTRACT:

Several questions connected with the theory of Fourier series are formulated and answered by the authors in a very clear manner by the application of negative fractional powers of differential operators. 5 theorems are given altogether, e.g.: Theorem: Let T be a positively definite selfadjoint operator in the Hilbert space H, let there exist a completely continuous inverse operator. Let λ_i and u_i be eigenvalues and eigen-

functions of T: $Tu_i = \lambda_i u_i$. Let Ω_{α} be the region of definition

of T^{α} ($\alpha > 0$). Let the operator T be continuous and let it act from H into a space ECH. Let $f \in \Omega_{\beta+\chi}$ ($\gamma \ge 0$). Then the Fourier series $(f,u_1)u_1+(f,u_2)u_2+\cdots+(f,u_n)u_n+\cdots$

Card 1/2

The Use of Fractional Powers of Operators in the Study of a. SOV/20-122-6-6/49 Fourier Series by the Eigen Functions of Differential

> converges to f (norm convergence with respect to the norm of E), and we have

$$\|f - \sum_{i=1}^{n} (f, u_i)u_i\|_{E} = O(a_n^{-\delta}),$$

where a_n is the smallest one of the numbers λ_{n+1} , λ_{n+2} ,

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State

PRESENTED: June 5, 1958, by S.L. Sobolev, Academician

SUBMITTED: June 4, 1958

Card 2/2

AUTHORS: Bakhtin, I.A., and Krasnosel'skiy, M.A. 307/20-123-1-3/56 On the Theory of Equations With Concave Operators (K teorii TITLE: uravneniy s vognutymi operatorami) PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 1,pp 17-20 (USSR) ABSTRACT: Let K and K_1 , $K \subset K_1$, be comes in the real Banach space E. $x \leq y$ denotes that $y-x \in K_1$. For arbitrary $x,y \in K$ let the relation $\|x\| \le m \|y\|$ follow from $x \le y$. Let the nonlinear operator A be defined on K and let AKCK. From x ≤y let follow Ax ≤Ay. To every $x \in K$ let exist numbers $\alpha, \beta > 0$ so that $\alpha u_0 \le Ax \le \beta u_0$. For 0 < t < 1 let Atx > tAx; $Atx \neq tAx$ for all $x \in K$ for which $x > yu_0$, >> 0. Operators A with these properties are called concave. The concave operator A is called {K,uo}-concave if for x,y &K, where $x \geqslant xu_0$, $y \geqslant xu_0$ (x > 0), $y - x \in x$, it holds that from $tx \leq y$ (tx \neq y, t>0) there follows Ay-tAx $\gg Su_0$, where $\delta > 0$. Theorem: Let A be concave and completely continuous, let φ = A φ have a unique, not vanishing solution φ^* in K. Then the successive approximations $\varphi_{n+1} = A \varphi_n$ converge to φ^* with Card 1/3

On the Theory of Equations With Concave Operators SOV/20-123-1-3/56

> respect to the norm for all $\phi_o \in K$, $\| \phi_o \| \neq 0$. Theorem: Let the functions K(s,t,u) and $\phi(s,t,u) = \frac{1}{u} K(s,t,u)$

> continuous in u and positive for u>0 have the following properties: a) $K(s,t,0)\equiv 0$, K(s,t,u) monotonely increasing for increasing u, $0 \le u < \infty$; b) for $0 \le u_1 \le u_2$ it holds:

 $\inf_{s \in \mathbb{R}} \left[\Phi(s,t,u_1) - \Phi(s,t,u_2) \right] > 0; \quad c) \text{ for } u \to 0, u \to \infty$ a≤s,t≤b

there exist uniform limit values of $\phi(s,t,u)$ with respect to s,t; for u -> 0 a positive bounded function is obtained, for $u \rightarrow \infty$ either a positive bounded function or zero is obtained.

 $A\varphi = \int K[s,t,\varphi(t)]dt + f(s)$. Let the equation $\varphi = A\varphi$,

where f(s) is a non-negative function, have a positive solution $\varphi*(s).$

Then the sequence

 $\Psi_{n+1}(s) = \int K[s,t, \Psi_n(t)] dt + f(s)$

Card 2/3

APPROVED FOR RELEASE: Monday, July 31, 2000

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On the Theory of Equations With Concave Operators

SOV/20-123-1-3/56

converges uniformly to $\varphi^*(s)$ for every non-negative function $\varphi_o(s)$, $\varphi_o(s) \neq 0$.

Two further theorems contain refinements of these assertions for some special cases (e.g. for special $\{K_1, u_0\}$ -concave operators). There are 8 Soviet references.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: June 9, 1958, by P.S.Aleksandrov, Academician

SUBMITTED: May 10, 1958

Card 3/3

AUTHORS: Krasnosel'skiy, M.A. and Perov, A.I. SOV/20-123-2-6/50

TITLE:

On a Principle of the Existence of Bounded, Periodic andost-Periodic Solutions of a System of Ordinary Differential Equations (Ob odnom printsipe sushchestvovaniya ogranichennykh, periodicheskikh i pochti-periodicheskikh resheniy u sistemy obyknovennykh differentsial'nykh uravneniy)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 2, pp 235-238 (USSR)

ABSTRACT: Given the system

(1) $\frac{dx}{dt} = f(t,x),$ where $x = (x_1, \dots, x_n)$ and $f = (f_1, \dots, f_n)$, $f_1 = f_1(t, x_1, \dots, x_n)$ and the f_1 are continuous in $-\infty < t, x_1, \dots, x_n < +\infty$. Let further $\lambda(x)$ and $\lambda(x)$ be two continuously differentiable functions, $\lambda(-x) = \lambda(x)$,

 $(f(t,x),grad \lambda(x)) = \sum_{i=1}^{n} f_i \frac{\partial \lambda}{\partial x_i} > 0$

for $||x|| \ge R > 0$. Let $m = \min_{\|x\| = R} \lambda(x)$, $M = \max_{\|x\| = R} \lambda(x)$. On the set T of those $x \in E^{n}$ for which $m \in \lambda(x) \le M$, $\|x\| > R$, let $\lambda(x) = 0$ satisfy

Card 1/3

On a Principle of the Existence of Bounded, Periodic and SOV/20-123-2-6,50 Differential Equations

the condition

$$(f(t,x), \operatorname{grad} \lambda(x) + \operatorname{grad} \mu(x)) = \sum_{i=1}^{n} f_{i} \left(\frac{\partial \lambda}{\partial x_{i}} + \frac{\partial \mu}{\partial x_{i}} \right) \geqslant 0,$$
here

where $\lim_{x \in T, ||x|| \to +\infty} ||M(x)|| = +\infty$.

Theorem: Under the given assumptions (1) has at least one uniformly bounded solution on (-00,00). If the f are periodic in t. then (1) has at least one

in t, then (1) has at least one periodic solution of the same in t, then (1) has at least one periodic (uniformly in every sphere)

in t, then (1) has at least one almost-periodic solution. The theorem holds in a strengthened form if instead of $\lambda(-x) = \lambda(x)$ and that the field of grad $\lambda(x)$ has a nonvanishing rotation on spheres of a sufficiently large radius (see [Ref 1, 7]). boundary Γ of a bounded domain $G \subset \mathbb{R}^n$ let the vector fields $f(t,x) = -\infty < t < \infty$ have a rotation different from zero. For (1)

Card 2/3